

**SANITARY  
SURVEY CHAPUT  
HUGHES AREA  
(TECK TOWNSHIP)  
TOWN OF  
KIRKLAND LAKE  
NORTHEASTERN  
REGION**

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SANITARY SURVEY  
CHAPUT HUGHES AREA (TECK TOWNSHIP)  
TOWN OF KIRKLAND LAKE  
NORTHEASTERN REGION

July 1975  
Municipal & Private Abatement  
Timmins District  
Northeastern Region

	<u>INDEX</u>	<u>PAGE NUMBER</u>
	<u>SECTION</u>	
	<u>INTRODUCTION</u>	2
I.	<u>GENERAL INFORMATION</u>	2
1.	<u>Weather</u>	3
II.	<u>TECHNIQUES</u>	4
1.	<u>Field Work</u>	4
2.	<u>Handling of Samples</u>	4
3.	<u>Significance of Results</u>	4
4.	<u>Sample Results</u>	5
5.	<u>Maps</u>	5
III.	<u>SANITARY WASTE DISPOSAL</u>	5
1.	<u>Sewered Areas</u>	
	i) Septic Tank #1	6,7,8,9,10
	ii) Septic Tank #2	11,12
2.	<u>Unsewered Areas</u>	
	i) Chateau Drive and The Don Lou Motel Area	12
	ii) Lakeshore Mine Property	13
	iii) Hilltop Drive Area	13
	iv) Beaver Drive Area	13,14
	v) Kirk St. Area	14
	vi) Government Rd.	15
IV	<u>WATER QUALITY OF CHAPUT HUGHES POND AND DRAINAGE AREA</u>	16
V	<u>ABANDONED TECK HUGHES MINE PROPERTY</u>	17
VI	<u>SUMMARY AND CONCLUSIONS</u>	17
VII	<u>RECOMMENDATIONS</u>	18
	<u>APPENDIX I</u>	20
	<u>Significance of Laboratory Analysis</u>	20
	<u>TABLE I -</u>	
	- Results of Bacteriological Examination	22,
	<u>TABLE II -</u>	
	- Results of Chemical Analysis	23,

## INTRODUCTION

On July 10, 11, and 14, 1975 a sanitary survey was conducted in the community of Chaput Hughes by the Ministry of the Environment.

This preliminary sampling program was designed to determine what methods of sewage disposal are presently being used in the community, and to locate pollution resulting from these practices. A total of 24 bacteriological and 7 chemical samples as well as 1 phenol sample were obtained from various ditches and ponds in the community to ascertain what levels of pollution prevail in these water courses.

### I. GENERAL INFORMATION

Chaput Hughes, a community with a 1974 assessed population of 892 is part of the Town of Kirkland Lake in the geographic Township of Teck. It is situated approximately two miles southwest of the Town centre of Kirkland Lake on Highway #66. For the purpose of this survey, the study boundaries included the Don Lou Motel and the area extending in a southwesterly direction along Highway #66. The southern limit was placed just beyond the termination of urban development on Government Rd.

The main portion of Chaput Hughes stretches along both sides of Government Road, with a concentrated area of development lying to the northeast. Several clusters of houses exist on both sides of Highway #66 between Chaput Hughes and the centre of the Town of Kirkland Lake.

Drainage for the area which has the most intense urban development flows into a pond located south of Chaput Hughes Avenue and east of Government Road.

Weather

Prior to this survey the weather was unusually hot and dry.

The amounts of precipitation listed in the following table were obtained from the Earlton Airport.

MONTH/DAY	PRECIPITATION IN INCHES :
June 23	0
June 24	0
June 25	0
June 26	0
June 27	0
June 28	0
June 29	0
June 30	0
July 01	0
July 02	.64
July 03	TRACE
July 04	TRACE
July 05	0
July 06	.43
July 07	.01
July 08	0
July 09	.02
July 10	TRACE
July 11	0
July 12	0
July 13	.02
July 14	
TOTAL	1.12

## II TECHNIQUE

### (1) Field Work

Interviews with residents living in unsewered areas were conducted by the three members of the survey team, to determine the method of sewage disposal being utilized. All these areas are connected to the town water supply system.

Where possible, ditches in the unsewered area as well as those originating from the two communal septic tanks were inspected in order to locate the source and discharge point of each ditch. To ascertain what levels of pollution were present in these ditches, bacteriological samples were obtained.

### (2) Handling of Samples

Bacteriological samples were kept packed in ice to minimize change in the level of coliform bacteria which could cause unreliable sample results. These samples were shipped daily to the Ministry of Health Laboratory in Timmins via the Ontario Northland Bus. Chemical and phenol samples were sent by express to the Ministry of the Environment Laboratory in Toronto.

### (3) Significance of Results

The level of coliform bacteria present has been used as an indication of the amount of pollution existing in the water from which the sample was taken. Coliform organisms are a species of bacteria which normally inhabit soil and vegetation and are present in the faecal matter of humans and warm blooded animals. Recent pollution of sewage origin is indicated by levels exceeding 1000 total coliforms/100 mls and 100 faecal coliforms/100 mls. Human faecal matter is the major source of unnaturally high coliform levels. Total coliform counts of 8,000<sup>+</sup>/100 mls are indicative of raw sewage. The count of coliform organisms actually present may be in excess of 10 million/100 mls; the lower counts are due to the testing limits used in the laboratory.

The laboratory bacteriological examination procedure has been explained in Appendix I, under bacteriological examination.

#### (4) Sample Results

The results obtained from bacteriological examination are listed in Table I. Included are the sample point number and the location of each sample taken, as well as the examination results.

Chemical analyses are listed in Table II. The location of each sample has also been placed in this table. The corresponding results of bacteriological examination have been included in this table to facilitate a comprehensive evaluation of the water quality at these sample points.

#### (5) Maps

Appended to this report is a map showing the following:

The two communal septic tanks and portions of the two ditches into which the effluents discharge, the area served by each communal septic tank, sample points and other ditches, and the Chaput Hughes pond. Unscaled extensions have been drafted onto this map in the northeastern and southern portions of Chaput Hughes.

### III SANITARY WASTE DISPOSAL

#### (1) Sewered Area

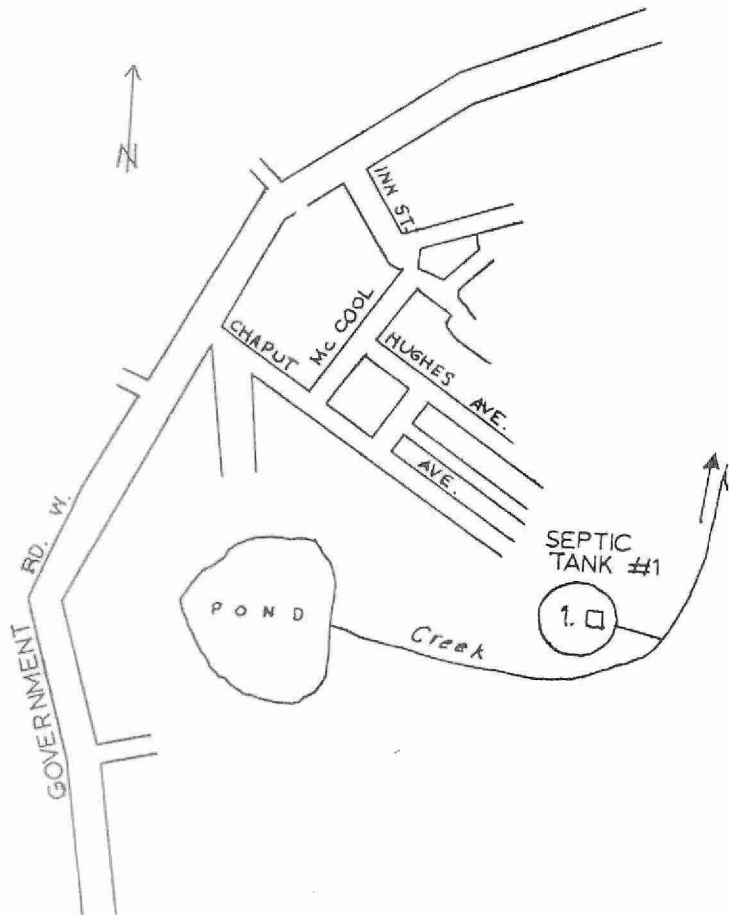
Two large communal septic tanks receive the raw sewage from the areas serviced by sanitary sewers. Overloaded septic tanks typical of the two being used in Chaput Hughes provide only partial clarification of the raw sewage during the short retention period. The black streams of bacteria-laden sewage which emanate from both communal septic tanks demonstrate that the sewage is virtually untreated. A potential health hazard is imposed by such inadequate sewage disposal since the bacteriological content remains unaltered after passage of the liquid through the tank.



i) Septic Tank #1

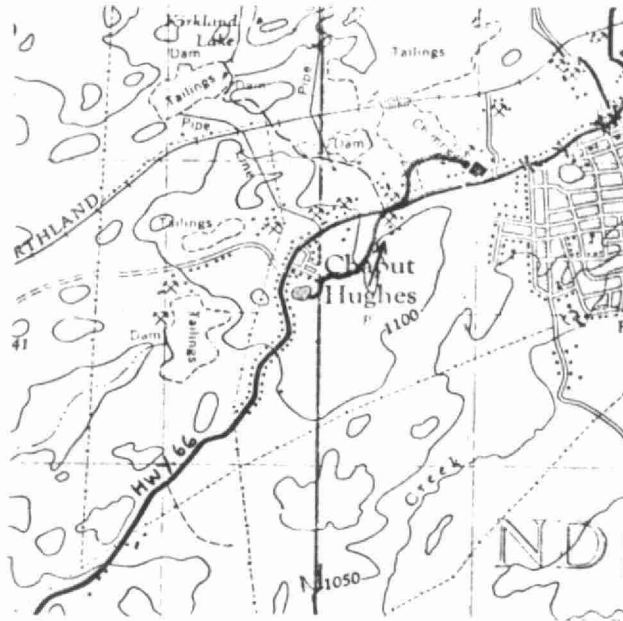
Septic tank #1, a large concrete structure consisting of one compartment with a 50,000 gallon capacity, is located to the east of Chaput Hughes Ave.. Reportedly sanitary wastes from dwellings on Government Rd., north of Horner Rd., and from the northeastern sewered section including West End Public School are transported through the sewer system to this septic tank. Approximately 100 homes are served by this tank. The septic tank and the area which it serves is shown in the map below.

Northern portion of Chaput Hughes area served by septic tank #1



A small creek which has its source in a pond located to the south of Chaput Hughes Ave. receives the effluent from this septic tank. The complete course of this creek has been shown in the map below.

Course which Creek Flows from Origin in Chaput Hughes Pond to Mouth in Pond of Kirkland Lake



A bacteriological sample (SD-1) taken from the point at which the creek leaves the pond yielded a total coliform count of 40/100 mls. The total Kjeldahl at this location, 5.6 ppm, was significantly higher than the normal range which extends from 0.1 to 0.5 ppm. The low levels of nitrite and nitrate less than 0.02 ppm and less than 0.2 ppm respectively which accompanied the high Kjeldahl level indicate that the nitrogenous matter in the water is primarily organic. Not enough time has passed since the pollution entered the pond to allow the organic nitrogenous compounds to decompose, which would result in the production of appreciable amounts of nitrite and nitrate. Therefore, it can be assumed that pollution probably of sewage origin, has recently contributed a large volume of nitrogenous matter to the pond.

Downstream from this sample point and prior to the entry of the septic tank effluent to the creek, total and faecal coliform sample results (SD-2) were 28,000/100 mls and 80/100 mls respectively. Here the Kjeldahl level is 0.9 ppm and the nitrite level rises to 0.04 ppm. The nitrate level remains less than 0.2 ppm.

The septic tank effluent emerges from an underground pipe connected to the septic tank. The liquid is blackish - grey in colour and smells strongly of sewage. It enters the creek roughly 100 feet downstream from the pond; total and faecal coliform counts of 80,000<sup>+</sup>/100 mls and 8,000<sup>+</sup>/100 mls were obtained from the effluent. The Kjeldahl level rises sharply here to 16 ppm, and is coupled once again with very low nitrite and nitrate levels. Little decomposition in the organic nitrogen has taken place; the sewage passes through this septic tank in a comparatively short time.

A member of the survey team followed the creek from the pond to the point at which it flows under Highway #66. (See the map on the previous page for the approximate location of the creek which passes through this marshy swamp-like pond). A total of four bacteriological samples (SD-3 to SD-6) were taken between the point at which the effluent from the septic tank enters the creek and the point at which the creek flows under the highway; in all four cases the sample results exceeded an 80,000/100 ml total coliform count and an 8,000/100 mls faecal coliform count. A chemical sample from the marsh area was found to have a Kjeldahl of 12.0, accompanied once more by low nitrite and nitrate levels. Organic nitrogen remains as the major nitrogenous constituent in this water. The creek emerges to the west of the inoperative, Teck Hughes Mine shaft and then passes under the highway through a culvert.

At the time of the survey a noteable decrease in the coliform

level occurred after the creek has passed under the highway and before it flowed through the residential section of the Teck Hughes property, north of the highway.

In this portion of the creek, the water was clear, but brown foam was observed near the edges of the channel. The bottom was coated with a brown slimy substance. Bacteriological samples revealed a total coliform count of 2900/100 mls and a faecal coliform count of 1100/100 mls (SD-7). Before following the course of the creek through the Teck Hughes property, the survey team attempted to obtain permission from the residents to allow them to enter the property. Mr. Morgan, was initially reluctant to have the survey team inspect the creek; he stated that the residences located on this property had faulty sewage disposal systems and that the individuals residing here were aware that they were contributing pollution to this creek. A member of the Timiskaming Health Unit and a Ministry of the Environment employee, both familiar with the situation had previously pointed out this source of pollution to the survey team.

When permission to enter the property was granted, we traced the path of the creek as far as possible. The creek water was clear and odour free travelling through a moist black spongy textured soil. No outlet pipes from the residences on the Teck Hughes property were located. A bacteriological sample (SD-8) was acquired slightly downstream from the first two residences located near the bank of the creek. Another sample (SD-9) obtained here was found to have similar bacterial results. These high levels of bacteria verify that domestic wastes are being discharged from these homes to the creek. Farther downstream, the creek makes a 90 degree turn, and heads in an easterly direction. The results of bacteriological examination (SD-10) remain unchanged at this point.

The vegetation in and near the creek became particularly dense at this point. Cattails 9-11 feet in height grow from the extremely swampy ground; it becomes impossible to follow the creek through this area. By taking an alternate route, we were able to locate the discharge point of the creek, the water enters a small pond to the rear of the Kirkland Lake Shopping Mall.

A sample (SD-11) obtained from the creek upstream of its mouth had a total coliform count of 3000/100 mls and a faecal coliform count of 1700/100 mls. It appears that some purification of the watercourse has taken place, but the level of pollution entering the pond remains high. A kjeldahl level of 0.4 ppm was recorded, as well as low nitrite and nitrate results. The kjeldahl level had decreased significantly from the levels obtained upstream near the discharge from septic tank #1, and was now within the acceptable range.

The pond receiving the discharge is presumably a remaining portion of the body of water which was once Kirkland Lake. The vast amount of tailings produced by local mines have reduced this lake to a few comparatively small ponds of water. The pond into which the creek flows has an estimated diameter of 100 feet. Its steep sides are completely covered with submerged weeds and patches of bright green algae.

Total phosphorus levels in all five chemical samples acquired at various points between the origin and discharge point of the creek in all cases exceeded 0.01 ppm. Levels of phosphorus greater than this value have been shown to promote the growth of algae.

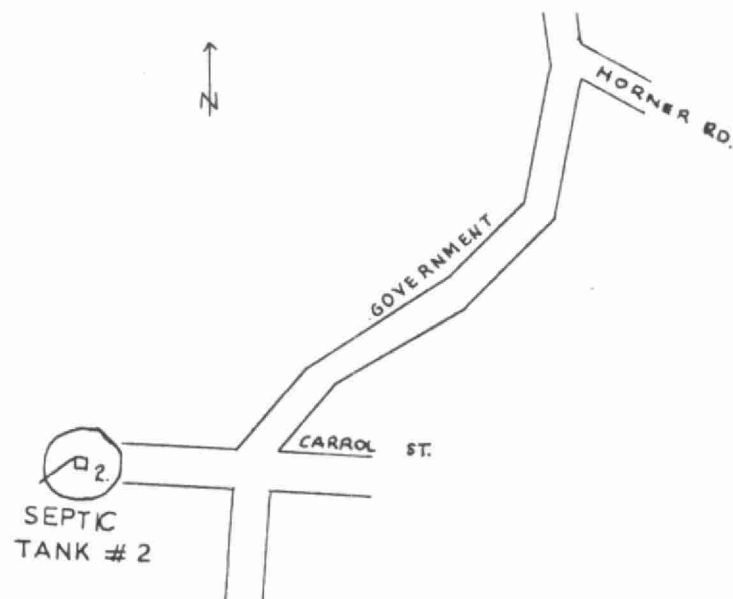
Two samples were acquired from the pond with the following results: 500 total coliform/100 and 210 faecal coliform/100 mls on the northern shore, 65 total coliform/100 mls and 0 faecal

coliform/100 mls on the western shore. Fencing has been erected around the tailings area to discourage trespassers; however, the fencing is in need of repair in at least one location.

ii) Septic Tank #2

The second communal septic tank, which serves an estimated 50 houses in the community, lies west of Carrol St. Wastes received by this septic tank originate in the sewered area of Government Rd., south of Horner Road. The tank is concrete, consisting of one 4,700 gallon compartment. A small map depicting the area served by this tank has been included below.

Southern Portion of Chaput Hughes Served By  
Septic Tank #2



A ditch which is the discharge point for storm sewers draining Government Rd., lies to the southeast of the septic tank. A sample here gave a total coliform count of 5600/100 mls and a faecal coliform count of 180/100 mls (D-1). The effluent from septic tank #2 joins with the liquid in this ditch. An outflow pipe in the wall of the septic tank discharges a black foul smelling stream of sewage out of the tank. The effluent yielded total and faecal coliform counts of  $80,000^+$ /100 mls and  $8,000^+$ /100 mls (D-2) respectively. A high kjeldahl level of 5.6 ppm together with a low nitrite level of less than 0.02 ppm and a low nitrate level of less than 0.2 ppm confirms that the sewage emanating from this tank has been retained for a relatively short period of time. Bacterial break-down of organic nitrogen has not taken place to any appreciable extent.

The raw sewage, appearance unaltered, flows in a westerly direction, passing under Highway #66 through a culvert. On the west side of the Highway a large pond of sewage with an estimated area of 5 - 6 square yards collects a portion of the wastes from the ditch. Bacteriological examination of the water prior to its entry to the pond gave a total coliform count of  $80,000^+$ /100 mls and a faecal coliform count of  $8,000^+$ /100 mls.

An overwhelmingly strong odour of sewage prevails in the area; it is occasionally detectable on the highway, at least 25 feet higher than the pond. The pond is black to grey in colour. More than one quarter of the pond's surface is covered by a thick green and brown scum.

A small ditch, providing only minimal drainage, carries the raw sewage in a westward direction away from the pond; the liquid flows to the tailings from the Macassa Mine. Approximately 30 feet downstream from the pond of sewage the ditch water is still black in colour and possesses a strong odour.

At this point it spreads out into the soft ground in the surrounding bush, making it impossible for us to follow the course of the ditch to its mouth. The excessively high concentration of pollutants severely hinders the water's ability to purify itself.

(2) Unsewered Areas

i) Chateau Drive and the Don Lou Motel located south of Highway #66 and just before the central area of the Town of Kirkland Lake is reportedly serviced by a septic tank, with a weeping tile bed extending in an easterly direction. No discernable pollution is caused by this system.

A private home and a nursing home for senior citizens are located on Chateau Drive, on the opposite side of the highway from the Don Lou Motel. The private home utilizes an aquarobic sewage treatment system. A large concrete septic tank receives domestic wastes from the Chateau Nursing Home.

A discharge of liquid with the typical odour and appearance of sewage was flowing from the tank into a ditch. Installation of a tile bed was in progress at the time. This installation was again observed by the survey team on August 19. The work on the tile bed had been completed but several ponds of water, with the odour and appearance of sewage were present on the ground above the tile bed. The superintendent stated that he plans to look into the matter.

ii) Lakeshore Mine Property

Three homes are located on what was once known as the Lakeshore Mine Property, east of Chateau Drive and north of Highway #66. The homes are served by one septic tank with a tile bed lying to the north of the property. No evidence of pollution or odour was present.



iii) Hilltop Drive Area

Hilltop Drive is situated on the northeast side of Highway #66, southeast of the Teck Hughes property. Two homes situated to the northeast of the most northerly entrance to Hilltop Drive share a septic tank. Southwest of the Sauve Rd., two other homes share a different septic tank. These two tanks are located to the northwest of the homes they serve, at the foot of an embankment. Discharge to a ditch occurs and sample results of  $80,000^+$ /100 mls total coliform and  $8,000^+$ /100 mls faecal coliform confirm that the effluent is comparable to untreated sewage.

The fifth house in the area utilizes a private septic tank with no tile field. A resident stated that effluent from this septic tank flows in a northerly direction, entering the same ditch which collects the discharge from the other two septic tanks.

iv) Beaver Drive Area

There are 5 homes in the vicinity of Beaver Drive, immediately northeast of the A & W on Highway #66. The survey team was able to contact residents from only two of these homes.

One home at Beaver Drive uses a septic tank for which the tile bed is either malfunctioning or absent. An outlet pipe less than 40 feet from this home emitted a black stream of raw sewage; a total coliform count of  $80,000^+$ /100 mls and a faecal coliform count of  $8,000^+$ /100 mls were obtained. The ditch becomes completely dry approximately 20 ft. from the discharge point.

The other resident who was interviewed stated that they used an approved septic tank and tile bed. No discernable problems are created by this particular sewage disposal system.

The land in the Beaver Drive area is extremely rocky, with several outcrops both in front of and behind the homes. During the two visits made to this area, the survey team was unable to contact the residents in three of the homes. The team found no pollution problems resulting from these residences.

v) Kirk St. Area

This section of Chaput Hughes has small narrow streets and extremely dilapidated housing. It is likely that the six homes in the area were constructed more than 50 years ago. Five or possibly six unsewered homes are present in the Kirk St. Area. One residence is serviced by a septic tank lacking a tile bed. Two homes use chemical toilets, disposing of the remaining residue at the dumps. Residents in the remaining three homes were unavailable for interviews. Presumably, sink wastes are disposed of onto the surface of the ground or into cesspools.

vi) Government Rd.

Residential development has occurred in the southern end of Government Road beyond the limits of the sanitary sewer system; 21 houses are located in this vicinity. 12 of the residents interviewed claimed to have septic tanks, although two admitted that their systems are without tile beds. In three other cases residents did not know if their system included a tile bed. One residence uses a chemical toilet for sewage disposal; another residence uses an electric toilet. The survey team was unable to contact anyone in 7 of the homes located in this area.

Although the majority of the residences in the unsewered area of Government Rd., have septic tanks which receive waste wash water as well as sewage, individuals in 4 homes stated that their wash water is discharged directly into the bush.

Behind the homes on the east side of Government Rd., a sample of water emanating from a pipe of undetermined origin yielded a total coliform count of  $80,000^+$ /100 mls and a faecal coliform count of  $8,000^+$ /100 mls. The water was clear and absent of any discernable odour. No other ditches or pipes were found behind these homes. The weather was unusually hot and dry in the 3 weeks prior to the survey, with approximately 1 inch of precipitation falling during that time. It is likely that other discharges from residences would be difficult to locate since the dryness of the soil would encourage the flow of liquid into the ground.

A narrow extremely shallow ditch passes over the front lawns of several homes on the west side of Government Road. The liquid in the ditch maintained a depth of less than 2 inches. It seems to originate near 824 Government Rd. and travels almost to the end of the developed area on this street. Here it crosses under the road through a culvert. The ditch becomes dry less than 15 feet past this point. Total and faecal coliform counts of samples obtained from three different locations were in all cases  $80,000^+$ /100 mls and  $8,000^+$ /100 mls. The sewage in this ditch is a black colour and possesses an unpleasant odour typical of untreated human wastes.

A chemical sample taken from this ditch on the eastern side of Government Rd., had a kjeldahl level of 83 ppm. This is far in excess of the normal acceptable range; the raw sewage in this ditch contains a high proportion of organic nitrogenous material. The nitrite level was 0.02 ppm, a result which shows that decomposition of the sewage is in progress.

The nitrite level was less than 0.2 ppm; decomposition had only begun.

IV) WATER QUALITY OF CHAPUT-HUGHES POND AND DRAINAGE AREA

A relatively large round-shaped pond with an approximate diameter of 250 feet is located south of Chaput-Hughes Ave., and east of Government Rd. This pond is completely encircled by weeds in an area of swampy ground. Drainage for the northeastern portion of the urbanized section of Chaput-Hughes flows into this pond. There was no inflow at the time of the inspection.

Examination of a bacteriological sample acquired from the northeastern shore of the pond, south of Chaput Ave. gave a total coliform count of 43,000/100 mls and a faecal coliform count of 8,000<sup>+</sup>/100 mls. It is quite possible that not all of the homes on Chaput Ave. are connected to the sanitary sewers located there.

A total coliform count of 1600/100 mls and a faecal coliform count of 1600/100 mls resulted from a sample obtained from the western shore of the pond behind the dwellings facing Government Rd. This high coliform count (consisting exclusively of faecal coliform organisms) is puzzling; the homes nearest this portion of the pond have been supplied with sanitary sewers. It is possible that homes on the eastern or northern shores are not connected to these sanitary sewers and are the source of this pollution. The high coliform count obtained on the northern shore suggests that the pollution originates in this area and circulates throughout the pond.

v) Abandoned Teck Hughes Mine Property

There are several abandoned buildings which were once used by the Teck Hughes Mine, located on the south side of Highway #66. The road leading to this property has been chained off, to prevent access to the site.

Five houses and four mine buildings, including the mine shaft have been abandoned on this property. All the buildings have been partially destroyed. Most of the houses have been stripped of all usable materials, and much of the resultant litter is scattered through-out the property. The mine buildings are in an equally advanced state of decay; with the brick walls of some structures crumbling to leave the basements exposed. Three derelict motor vehicles are also present.

VI SUMMARY AND CONCLUSIONS

Two large concrete septic tanks dispose of the sanitary wastes from the two sewerred areas of Chaput Hughes. Both of these tanks emit black streams of sewage which are excessively high in coliform bacteria and total Kjeldahl levels. This method of sewage treatment is inadequate and is producing effluents which are potential health hazards.

Six unsewered areas in and near this community were included in the survey. Four of these areas were found to be discharging untreated sewage onto the ground.

The pond south of Chaput Ave. and east of Government Rd. was also found to obtain unnaturally high levels of coliform organisms. Although residences located near this pond are reportedly supplied with sanitary sewers, there is a possibility that unsewered residences exist and are contributing sewage to this pond.

RECOMMENDATIONS

(1) All buildings presently adjacent to existing municipal sewers should be required to connect to them (This may require the installation of pumps within the individual buildings).

(2) Where sewer extensions are needed to permit the servicing of the remainder of homes in the tributary area, these sewer extensions should be constructed by the town immediately. The two most prominent areas where such installations are required are:

- (1) Kirk Street Area
- (2) Government Road West

(3) The raw sewage in the municipal sewers must be directed to a treatment facility which is capable of providing a high quality effluent which can be assimilated by the water course receiving the effluent.

(4) The five homes in the Hilltop Drive area should be required to provide adequate weeping tile systems for their existing septic tanks. (There are not enough homes here to make municipal servicing an economically feasible alternative).

(5) The sewage disposal arrangements at 2 Beaver Drive should be improved to eliminate the raw sewage discharge.

(6) On the Teck Hughes property, the septic tanks do not provide adequate treatment for the domestic sewage so improvements must be made. If this property is to be divided into smaller parcels, the sewage disposal problems must be solved on an individual basis.

(7) The sewage disposal facility for the Chateau Nursing Home must be upgraded so that it can operate without any discharge of sewage onto the ground or into any ditches.

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## APPENDIX I

### Significance of Laboratory Analyses

#### BACTERIOLOGICAL EXAMINATION

The presence of coliform bacteria in water is used as an indication of the amount of existing pollution. Faecal coliform counts greater than 100/100 mls accompanied by total coliform counts exceeding 1000/100 mls denote that contamination of sewage origin has occurred.

The Ontario Health Laboratory which performed the bacteriological analysis employs the Membrane Filter (M.F.) technique of examination. A membrane with small pores is used to filter a known volume of water. The filter is placed in a culture medium which favours the growth of the organism for which the sample is to be examined. After an incubation period the number of colonies of bacteria present are counted, allowing the determination of the number of organisms present in the original water sample.

#### CHEMICAL ANALYSES

##### Total Kjeldahl Nitrogen

Total kjeldahl nitrogen is a measure of the organic nitrogen plus the inorganic free ammonia which corresponds to the amount of organic nitrogen present. The normal range for total kjeldahl would be 0.1 to .05 ppm.

Nitrogen is converted during a sequence of reactions from the organic to the nitrite and then nitrate forms. The relative concentrations of these compounds can be used as an indication of how far these reactions have progressed, a high kjeldhal level accompanied by low nitrite and nitrate levels may indicate a recent input of sewage. Organic nitrogen in a water signifies that the pollution is recent for the sewage has not yet had sufficient time to decompose to the more highly oxidized products in the nitrogen cycle.

#### NITRITE, NITROGEN

Nitrite is an intermediate substance formed by autotrophic nitrifying bacteria during the decomposition of organic nitrogen and prior to the formation of nitrate. Since nitrite is highly unstable, bacteria rapidly convert it to other compounds. Nitrite levels exceeding 0.02 ppm denote that bacterial action is taking place.

#### NITRATE, NITROGEN

Bacteria which oxidize nitrite form nitrate, the end production in the decomposition of organic nitrogen. The relative concentration of nitrate signifies to what extent organic nitrogenous matter has been broken down. High nitrate levels are undesirable in drinking water supplies because they contribute the methemoglobinemia in infants; high levels of nitrate in surface waters serve to promote undesired algal growth. A low concentration would be 0.1 ppm, with a moderate concentration in the range of 0.1 to 1.0 ppm, a high concentration would exceed 10 ppm.

#### TOTAL PHOSPHORUS

To maintain the balance between plant and animal life, a certain amount of phosphorus is essential. However, unnaturally high inputs of phosphorus from sources such as fertilizer, synthetic detergents and sewage promote algal growth, seriously decreasing the quality of the water. Levels of inorganic phosphorus greater than 0.01 ppm are known to contribute to the development of algae.

#### PHENOLS

Phenolic substances contained in a water sample generally originate from petroleum products, gaining access to water courses from industrial pollution. Phenol levels for domestic water supplies must not be greater than 20 ppb.



BIO-CHEMICAL OXYGEN DEMAND (BOD)

Chemical reactions performed by bacteria during the decomposition of organic matter in the water deplete the amount of dissolved oxygen available. When untreated sewage is discharged to a water course large volumes of organic matter are added. To measure the bio-chemical oxygen demand, the sample is aerated, sealed and incubated at 20°C for a five day period. The residual oxygen present in the water is then determined. The amount of oxygen consumed is roughly proportional to the amount of biodegradable organic matter present. The BOD level attributed to natural sources is generally considered to be 3 ppm. Higher BOD results show that a large quantity of oxygen is being used and that a proportionally large volume of organic matter is present.

CHAPUT HUGHES

TABLE I

RESULTS OF BACTERIOLOGICAL EXAMINATION

<u>SAMPLE NUMBER</u>	<u>LOCATION</u>	<u>TOTAL COLIFORM Per 100 mls</u>	<u>FAECAL COLIFORM Per 100 mls</u>
D-1	Ditch on Carrol St., Southeast of Septic Tank #2	5,600	180
D-2	Effluent from Septic Tank #2	80,000 <sup>+</sup>	8,000 <sup>+</sup>
D-3	Downstream from D-2 on Opposite (West) Side of Highway	80,000 <sup>+</sup>	8,000 <sup>+</sup>
A-1	Eastern Shore of Pond Located South of Chaput Avenue	43,000	8,000 <sup>+</sup>
A-2	Northern Shore of Pond Located South of Chaput Ave.	1,600	1,600
SD-1	Origin of Creek from Chaput Hughes Pond	5,500	40
SD-2	Just Before Outflow of Septic Tank #1	28,000	80
SD-3	Effluent of Septic Tank #1	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-4	50 Feet before First Marsh	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-5	200 Feet Past SD-3 in Marsh	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-6	At Lake Type Marsh	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-7	Ditch Before Entrance to Residential Portion of Teck- Hughes Property	2,900	1,100
SD-8	Past First Two Residences on Teck-Hughes Property	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-9	Past Two Largest Houses on Teck-Hughes Property	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-10	At Bend in Ditch	80,000 <sup>+</sup>	8,000 <sup>+</sup>
SD-11	Creek Entrance to Pond Behind Kirkland Lake Shopping Mall	3,000	1,700
K-1	N.E. Shore of Pond Behind Mall	500	210
K-2	Nw Shore of Pond Behind Mall	65	0
G-1	Ditch in Front of 824 Government Rd.	80,000 <sup>+</sup>	8,000 <sup>+</sup>
G-2	Ditch in Front of 852 Government Rd.	80,000 <sup>+</sup>	8,000 <sup>+</sup>
G-3	Across Road and Downstream from D-1, D-2	80,000 <sup>+</sup>	8,000 <sup>+</sup>
G-4	Water Behind Houses on East Side of Unsewered Area on Government Rd.	80,000 <sup>+</sup>	8,000 <sup>+</sup>
B-1	Septic Tank Outflow from 2-Beaver Drive	80,000 <sup>+</sup>	8,000 <sup>+</sup>
H-1	Hilltop Drive Area Septic Tank Outflow	80,000 <sup>+</sup>	8,000 <sup>+</sup>

CHAPUT HUGHES  
TABLE II  
RESULTS OF CHEMICAL ANALYSES

SAMPLE NUMBER	LOCATION	TOTAL KJELDHAL NITROGEN mg/l as N	NO <sub>3</sub> mg/l as N	NO <sub>2</sub> mg/a as N	TOTAL PHOSPHORUS mg/l as P	PHENOL (ppb)	BACTERIOLOGICAL TOTAL Coliform per 100 mls	FAECAL COLIFORM per 100 mls	Cl mg/l
SD-1	Point at Which Creek Leaves Chaput Hughes Pond	5.6	.02	.2	1.3	-	5,500	40	40
SD-2	Ditch Water Before Outflow of Septic Tank #1	.9	.04	.2	.16	-	2,800	80	55
SD-3	Effluent of Septic Tank #1	16	.02	.2	2.3	-	80,000 <sup>+</sup>	8,000 <sup>+</sup>	31
SD-5	Marsh Area Downstream of Septic Tank #1	12	.02	.2	1.4	-	80,000 <sup>+</sup>	8,000 <sup>+</sup>	36
SD-11	Creek Entrance to Pond Behind Kirkland Lake Mall	.4	.02	.2	.04	-	3,000	1,700	39
D-2	Effluent of Septic Tank #2	5.6	.02	.2	1.3	-	80,000 <sup>+</sup>	8,000 <sup>+</sup>	40
G-5	Ditch on Government Rd. South of Communal Sewer System	83	.02	.2	39	-	--	--	85



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